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study. This is the principal failing in Brown's *Physiology for the Laboratory* (Boston, Ginn & Co., 1900, viii + 167 pp.), which, however, is so well balanced in other respects that it deserves to be in the hands of the teacher if not in those of the pupil.

Kelly (*Jena. Zeitschr.*, Bd. XXXV, p. 429) has pointed out that calcic carbonate occurs in nature in five forms: calcite, aragonite, ktypeite, conchite, and amorphous calcium carbonate. Of these calcite and conchite are the only ones found abundantly in organisms. Conchite is probably slightly more soluble, harder, and has a higher specific weight than calcite. Both forms occur throughout the animal series; thus calcite is the mineral component of the shells of echinoderms, brachiopods, crustacea, bryozoa, of the calcareous spicules of sponges, of the ear stones of fish and amphibia, and of the eggshells of mollusks, most reptiles, and birds; conchite is characteristic of the skeletons of most stone corals, and the shells of many mollusks.

Steinach and later Magnus have shown that the iris of a frog's eye will contract when stimulated by light, even after the eye has been removed from the animal. Steinach believed this to be due to the direct action of light on the sphincter muscle; Magnus attributed it to a short nervous reflex arc within the eye. Guth (*Archiv ges. Physiol.*, Bd. LXXXV, p. 119) finds that frog eyes show this reaction fully two weeks after their removal from the animal,—a period much longer than that during which other organs containing reflex arcs, like the intestine, remain active. Moreover, pieces of the edge of the iris as well as minute isolated groups of muscle fibres from the sphincter pupillæ contract on illumination. As the latter were shown on microscopical examination to contain no ganglion cells, it must be admitted that Steinach's contention that the muscles of the iris are capable of being stimulated directly by light is correct.

BOTANY.

Recent Papers on Algæ. — (Comère, Joseph. *Les Desmidées de France*, Paris, 1901, 222 pp., 16 pls.) In the introduction the author states his double purpose in writing this work; first, to give as full an account as possible of our present knowledge of the desmids; second, a manual for the study and determination of the French species. The first chapter deals with structure and physiology, the second with methods of collection, preparation, and study ; then is a historical sketch, with bibliography, dealing with France only. Chapter 4 occupies the greater part of the book, giving the general principles of classification, followed by description of all known French species and forms. A table showing the distribution in the different provinces of France and a list of all works cited complete the text. There are sixteen plates, containing over eight hundred figures.

It is somewhat singular, considering how much of our best algological work is done by French writers, that there has never been any general systematic work on French algæ, such as Harvey's *Manual* or *Phycologia* in Great Britain, Hauck's *Deutsches Meeresalgen* in Germany, and similar works in other countries. This seems to be the first work treating of algæ, covering the whole of France, and giving descriptions of all the species mentioned. It must certainly be of much use to French students.

The classification follows in general that used by De Toni in the *Sylloge Algarum*, but with some modifications. The tribe Docideæ is united with the Closteriæ, while the Micrasteriæ retain only the forms with chromatophores as parietal disks, the forms having radial chromatophores forming the tribe Cosmariæ. The form of the chromatophores is recognized as of value in classification, but the author does not give it the value attributed by Gay.

A scientific work written by a Frenchman always has one great advantage, the "inexorable clearness" of the language ; moreover, a French author apparently does not feel that a good style of writing will cast doubts on his scientific thoroughness or soundness. These merits the work in question has, and also the French predilection for symmetry ; the description is a description, the note a note, and one does not run into the other ; history does not intrude into physiological discussion, nor bibliography into directions for collecting.

The plates are clear, every species described being represented, mostly by camera drawings by the author. In nearly every case a colored figure is given to show the appearance of the living plant, and a line drawing to show the markings of the empty cell. Only two scales of magnification are used, 200 and 300, and the same scale is used in all the species of a genus, which is very convenient for comparison. There is an index, both of accepted names and of synonyms.

The descriptions are sufficiently full, and appear to be accurate ; occasionally a word is used in a sense that might be misleading, as on p. 21, where certain desmids are said to occur "en parasites," on Sphagnum, etc. Full references are given to French authors, and a considerable number to foreign works, but the English language seems to offer great difficulties to M. Comère, as it has to many others of his nation. There are many references to Wolle's *Desmids of the United States*, and this work, with three papers published in the *Torrey Bulletin*, appears in the bibliography. It is fair to assume that M. Comère must have seen the book, but both in references and bibliography the name is "Woole." Quite curiously, at p. 98 there is a reference to another *Torrey Bulletin* article, which does not appear in the bibliography, and in this one place the name is properly spelled, "Wolle." "*Dysphynctium Thwatesii*," with synonym "*Calocylindrus Twatesii*," at p. 92, and "Twaites," p. 130, represent three attempts on the name of a well-known botanist. "Barcker in Quartely Journal, p. 208," is an interesting combination. A certain amount of carelessness in proofreading is noticeable here and there: in the bibliography Reinsch is followed by a period, as if an abbreviation, while Schaarschm has no period, though it represents Schaarschmidt. Sutarastrum, *Closterium monoliferum* are similar cases. But let him that never overlooked an error on a proofsheet cast the first stone at M. Comère.

The work makes no innovations and does not claim to add largely to previous knowledge, but it puts in small compass, and in shape convenient for the student, what otherwise would have cost him much time and trouble. Any work doing this is valuable. The nomenclature is eminently conservative; no new species is proposed, nor is any one transferred from one genus to another ; the author must have nobly resisted the temptation to attach his name to something.

(Kjellman, F. R. "Om Floridé-Slägtet Galaxaura dess Organografi och Systematik," *Kongl. Svenska Vetenkaps Akademiens Handlingar*, Bandet XXXIII. Stockholm, 1900. 109 pp., 20 pls.) The genus Galaxaura, of which this paper treats, has its home in tropical and subtropical waters, the broad belt occupied by it extending quite around the world, its northern limits being near the straits of Gibraltar and on the coast of Florida in the Atlantic, Mexico and Japan in the Pacific. In the southern hemisphere it reaches similar latitudes.

In Engler and Prantl's *Naturfamilien Pflanzen* the genus is noted as having about twenty species, many of them little understood. In examining the forms from Japan, collected by the Vega expedition and subsequently by Petersen, Dr. Kjellman found many that could not be placed under known species, and was led to make a thorough study of the genus. The result of this study may be seen in the fact that, of the sixty-two species here recorded, only sixteen are of previous authors; the remaining forty-six are new.

Habit characters, on which the previous classification was almost entirely based, are here considered as of little value, and structural characters are used instead, the descriptions being supplemented by nineteen quarto plates of anatomical drawings by the author, while a double plate gives habit figures, photographically produced from herbarium specimens. The rich collections of Areschoug, Agardh, and the author himself, with those in the Swedish museums, formed the material on which the work is based, and the fact that it was all dried material in herbaria constitutes the one possibly weak spot in the results. The ideal method of study would be to see all the species in their homes, to notice the range of variation of a species in different local conditions and at different seasons, and then, with the results of this study clearly in mind, to refer to the original types. But when this study of living material must be made over half the surface of the globe, or at least the seacoast within that area, it is evident that this ideal is hardly likely to be attained.

In the tables showing the distribution of the species, only three are assigned to the coast of the United States, *G. flagelliforme*, *G. stellifera*, *G. umbellata*. This number will have to be increased, as on the shores of Florida there occur *G. obtusata*, *G. rugosa*, *G. lapidescens*, and *G. marginata*. The last two species, in the older sense, are divided by Kjellman into several species each, so that the figure for our coast must be seven, and may be one or two more.

The descriptions of the new species and the explanations of the plates are in Latin; the rest of the work, including all the historical notes and the anatomical studies, are in Swedish, which is unfortunate in a work of such general scope and interest.

(Svedelius, Nils. "Studier öfver Östersjöns Hafsalgflora," *Akademisk Afhandling*. Upsala, 1901.) The author has made a careful study of the red, brown, and green algæ of the eastern and northern part of the Baltic Sea. The flora is quite a limited one, only fifty-six species being enumerated, there being a steady falling off in the number of species to be found as we pass from the German Ocean and along the Baltic to the Gulf of Bothnia. There is a steady reduction in the saltness of the water in this direction until at last it is almost imperceptible. Moreover, the east and west sides of the Baltic have differing degrees of salinity, and sudden changes in this, as also in the temperature, are produced by winds, conditions quite unfavorable to the existence of most marine algæ; hence the poverty of the flora.

Two elements appear to compose the flora, an Atlantic and an Arctic, but without any sharp division line. Four species, one of them new, *Ascocyclus affinis*, are considered endemic, thirty-five are characteristically Atlantic, seventeen characteristically Arctic. Most of the species appear in somewhat reduced or depauperate forms, in comparison with normal conditions. This is not the case with the green algæ, however, which are fully as well developed as elsewhere; not unnaturally, as the green algæ are largely fresh-water plants, the red and the brown being specially marine. As in the Arctic regions, some species cover considerable areas of bottom in loose-lying masses, not attached to any substratum, new growth continually forming as the old decays. These detached individuals are uniformly sterile, as is the case in the Arctic Sea, and also with the vast floating masses of Sargassum in the Atlantic. Green algæ are predominant in the upper littoral region, brown in the lower littoral, and red in the sublittoral, in about the same proportions as in the Atlantic.

There are a number of illustrations, mostly habit illustrations, among them a number of forms of *Fucus vesiculosus*, and transitions between forms; since names have been given these forms, it is perhaps well to illustrate them, but it is doubtful if they can be considered as at all well defined. It is usual to include under *F. vesiculosus* all diœcious forms with vesicles, as well as those that look as if they ought to have vesicles. It is not unlikely that more than one species may be here included, but we are not yet in a position to draw the lines.

The work is in Swedish, which is perhaps natural under the circumstances of its issue, but like Kjellman's work previously noted, it is not easy of use by the majority of botanists.

(Børgesen, F. Freshwater Algæ of the Færöes. From the *Botany of the Færöes.* Copenhagen, 1901.) Together with Mr. Børgesen's paper on the algæ, there are printed E. Warming's "Historical

Notes on the Botanical Investigation of the Færöes," and C. H. Ostenfeld's "Notes on Geography, Climate, Topography, Geology, and Industrial Conditions." Mr. Ostenfeld's notes are furnished with excellent illustrations, so that we reach Mr. Børgesen's list of the algæ with a good understanding of the conditions that have made the flora what it is. This flora must have been introduced since the last glacial epoch, and, according to the writer, it is probably more than anything else the birds that have gradually contributed the various fresh-water algæ found on these eighteen rocky islands, only five of which have an area of over 100 kilometers each. In their migrations through Great Britain to the Arctic region the birds make a stop on these islands, the distance from the northernmost British isles being only a two hours' flight. So we find two elements in the Færöe flora, a southern, agreeing with that of Great Britain, and including some forms supposed to be peculiar to the latter, and an Arctic element; the one brought by the spring migration, the other by the return in autumn.

In all, 323 species are enumerated, beside many varieties and forms. The desmids, with 175 species, constitute more than half of the whole, — the other green algæ number 103; there are forty-one Cyanophyceæ; one Nitella, one brown alga, *Hydrurus fœtidus*, and one red alga, *Chantransia hermanni*, complete the list.

Two species of Enteromorpha, *E. compressa* and *E. micrococca forma subsalsa*, were found in brooks at a height of 200–300 meters. The former has been considered exclusively marine, the latter has been found in brackish pools in the Arctic regions; their occurrence in running fresh water is quite noteworthy. Beside several new varieties and forms, two new species are described, *Euastrum lyngbyei* and *Cladophora lyngbyei;* a plate of the latter, however, shows a form of branching which hardly accords with Cladophora; it would seem as if the plant belonged rather in Siphonocladus.

There are four good plates and an excellent map, and the whole is in unexceptionable English.

(Hirn, Karl E. "Monographie und Iconographie der Oedogoniacien," *Acta Societatis Scientiarum Fennicæ.* Helsingfors, 1900.) This volume of 400 quarto pages and sixty-four plates is a notable addition to the working tools of the systematic algologist. One hundred and ninety-nine species of Œdogonium, forty-four of Bulbochæte, and one of Œdocladium are composed in the family. Full diagnoses of all the species, with their many varieties and forms, are given in Latin, and there is an elaborate key to the species in the same. The detailed notes under the species, as well as the general chapters, are in German. These general chapters give a full résumé, with illustrations in the text, of the structure, development, and physiology of the Œdogoniaceæ. Description, measurements, synonyms, and localities are given in ample detail, and the plates represent all the species and forms. The figures are in outline, and were drawn by the author from nature; all are of the same scale, 300/1, except a few details requiring a higher scale, and one habit figure of Œdocladium. This uniformity of scale is a great convenience in actual use of the work.

The standard work on this family has been Wittrock's *Prodromus Monographiæ Œdogoniearum*, published in 1874. In this are represented 140 species, but only a single plate, of general types, accompanied the work. In a family like this, where the vegetative characters are of great simplicity, the need of accurate figures increases even more rapidly than the number of species; the best of descriptions are insufficient. So that, though De Toni's *Sylloge Algarum* gives descriptions of all species published up to 1889, it is extremely difficult to determine species by it. Dr. Hirn had the advantage of study with Wittrock and Nordstedt, had opportunity to examine type specimens of nearly all species, and had been receiving material from collectors in all parts of the world for a number of years. As a result, the list of habitats includes all parts of the earth; even South America, generally an algological *terra incognita*, being quite well represented. North America, though with few exclusive species, shows quite a rich flora, but the author wisely places a (?) against those references in Wolle which he has not been able to verify by authentic specimens. Of the 244 species, forty-five are described here for the first time.

F. S. Collins.

Notes. — *Biltmore Botanical Studies* is the title of a new journal of botany embracing papers by the director and associates of the Biltmore herbarium, the first number of which was issued on the 8th of April. It is published at Biltmore, N. C. The first number contains a revision of the species of Marshallia and descriptions of a considable number of new species of other genera.

Fascicle 1 of Vol. II of *Plantæ Bakerianæ*, by Professor E. L. Greene and others, covering fungi to grasses of Mr. Baker's collections of 1899, has been issued under date of March 11.